tyco/Flow Control/ Tyco Valves & Controls
Penberthy

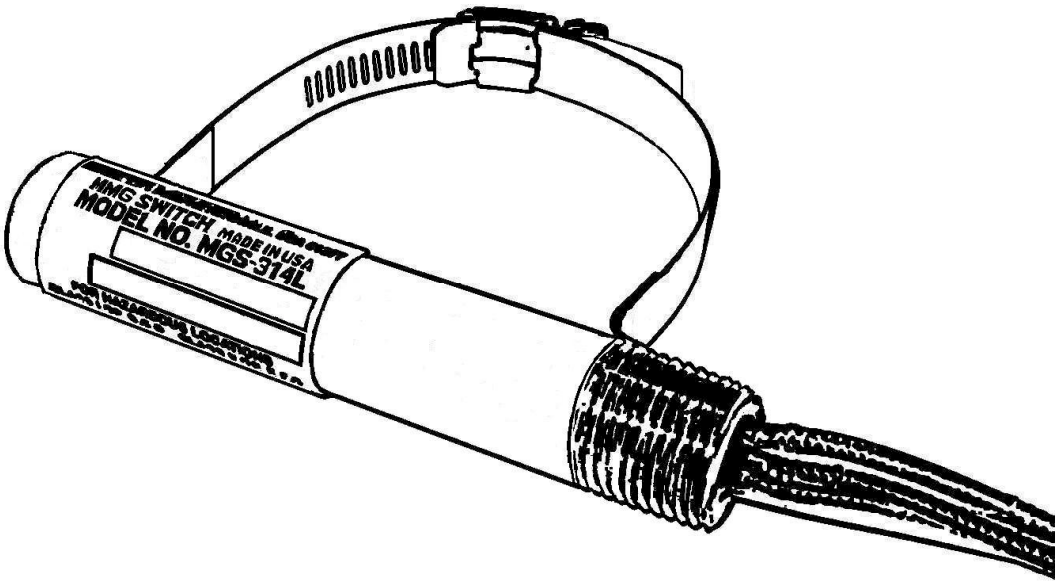
Section 4000
Instal. Instr. 4953
Issued 04/06
Replaces 02/99

PENBERTHY®

Model MGS-314L/ 314M Level Control Switch

(For use with the MULTIVIEW™ Liquid Level Gage)

Third Party Approvals Pending



Installation/Operation/Maintenance Instructions

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PRODUCT WARRANTY

Penberthy Inc., warrants its products as designed and manufactured by Penberthy to be free of defects in material and workmanship for a period of one year after the date of installation or eighteen months after date of manufacture, whichever is earliest. Penberthy will, at its option, replace or repair any products which fail during the warranty period due to defective material or workmanship.

Prior to submitting any claim for warranty service, the owner must submit proof of purchase to Penberthy and obtain written authorization to return the product. Thereafter, the product shall be returned to Penberthy in Prophetstown, Illinois, with freight prepaid.

This warranty shall not apply if the product has been disassembled, tampered with, repaired or altered outside of the Penberthy factory, or if it has been subjected to misuse, neglect or accident.

Penberthy's responsibility hereunder is limited to repairing or replacing the product at its expense. Penberthy shall not be liable for loss, damage, or expenses directly or indirectly related to the installation or use of its products, or from any other cause or for consequential damages. It is expressly understood that Penberthy is not responsible for damage or injury caused to other products, building, property or persons, by reason of the installation or use of its products.

THIS IS PENBERTHY'S SOLE WARRANTY AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED WHICH ARE HEREBY EXCLUDED, INCLUDING IN PARTICULAR ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

This document and the warranty contained herein may not be modified and no other warranty, expressed or implied, shall be made by or on behalf of Penberthy unless modified or made in writing and signed by the President or a Vice President of Penberthy.

INSTALLATION, OPERATION and MAINTENANCE MANUAL FOR PENBERTHY MODEL MGS-314L/314M LEVEL CONRTOL SWITCH

1.0 Introduction

The instructions in this manual pertain to the Penberthy Model MGS-314L or MGS-314M Magnetic Level Gage Switch.

The Model MGS-314L/314M Magnetic Level Gage Switch is designed to detect the passage of the float in a MULTIVIEW™ Magnetic Liquid Level Gage, at a specific location. The switch consists of a bi-stable latching reed switch encased in a watertight (Type 4), explosion proof (Type 7) enclosure.

2.0 Specifications/Approvals

2.1 Enclosure

Watertight (Type 4) and Explosion-proof (Type 7) 316 STS housing.

2.2 Switch

Output

MGS-314L/314M SPDT (Form C) switch output: 3/4 Amp continuous service, 1 Amp intermittent service at 130V DC/AC non-inductive load.

Repeatability

Better than 0.032" (0.81mm)

Response Time

100 milliseconds

Operating Temperature

-40°F to 225°F (-40°C to 107°C) with Third Party Approvals

Dead Band

0.5" (13 mm)

2.3 Approvals (Pending)

FM Approved
Explosion-proof for:
Division 1;
Class I; Groups B,C,D;
Class II; Groups E,F,G
Class III; Type 4
When installed in accordance with Penberthy Drawing #7E741-009

FM Approved
Intrinsically Safe for:
Division 1;
Class I; Groups A, B, C, D
Class II; Groups E, F, G;
Class III; Type 4
When installed in accordance with Penberthy Drawing # 7E742-009

CSA Approved Ex d
Explosion-proof for:
Division 1;
Class I; Groups B, C, D
Class II; Groups E, F, G;
Class III; Type 4
When installed in accordance with Penberthy Drawing #7E741-009

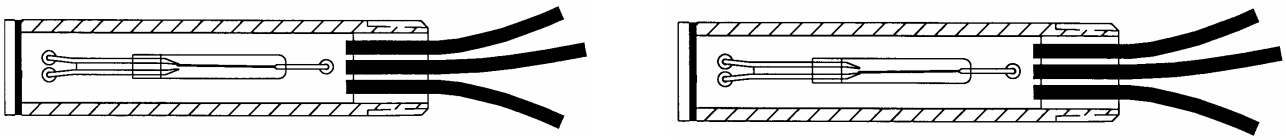
CSA Approved Exi a
Intrinsically Safe for:
Division 1;
Class I; Groups A, B, C, D
Class II; Groups E, F, G
Class III; Type 4
When installed in accordance with Penberthy Drawing # 7E742-009

3.0 Theory of Operation

While reading the theory of operation refer to Figure 1 for the location of the components. This figure applies for both the MGS-314L and MGS-314M switch. The description is based on a side view.

With the liquid level below the switch, the reed should be at position "A". The reed is held in this position by a magnetized stop. As the float ascends and passes the switch, it induces a magnetic field in the reed. The reed is coupled to the float and moves with it until contact with the opposite stop is made. The magnetized stop then holds the reed in its new position. The movement of the reed causes the switch to change state.

As the float descends with the liquid level it passes the switch and the process described is reversed. This returns the switch to its original state.



Position A **Position B**

Figure 1

4.0 Installation

4.1 Unpacking

Upon receiving the Model MGS-314L/314M Magnetic Level Gage Switch, check all components carefully for damage incurred in shipping. If damage is evident or suspected, do not attempt installation. Notify the carrier immediately and request a damage inspection. Check each item against the packing list.

4.2 Mounting the Switch

Due to shipping vibration, is possible the switch will not be in the "normal" position for proper operation. If this occurs, simply cycle the float past the switch once. This will automatically initialize it.

1. Measure the distance from the top of the indicating scale, on the Magnetic Level Gage, to the top of the communicating chamber. Record this distance.

2. Loosen the clamps holding the indicating scale to the communicating chamber.

3. Open the mounting band supplied with the MGS-314L/314M.

4. Place the MGS-314L/314M on the communicating chamber. The cut out in the switch housing should contact the communicating chamber. Place the mounting band around the chamber and under the indicator housing. For optimum performance the cut out should be parallel and the switch housing perpendicular to the communicating chamber.

5. Loosely tighten the mounting band. Move the MGS-314L/314M either up or down to the desired position, and tighten the band.

6. The switch must be mounted within the indication range for the magnetic gage. The mounting band for the switch should be a minimum of 1 inch (25 mm) inside the indication range. This will insure sufficient float movement to operate the switch.

7. If more than one switch is used on a single magnetic gage, the minimum recommended distance between mounting bands is 2 inches (51 mm).

8. Adjust the position of the indicating scale so that the distance from the tip of the scale to the top of the communicating chamber is the same as in Step 1. Tighten the clamps holding the indicating scale to the communicating chamber.

4.3 Wiring Connection

1. If you are using conduit for the switch wiring use conduit seal with a drain or a drip-loop to prevent condensate from entering the housing. Condensate can cause electrical shorts. (The switch housing has a ½" NPT-M connection for the wiring conduit.)

Note: Attach conduit prior to mounting switch on communicating chamber to relieve mounting stresses.

2. We recommend using aluminum or austenitic stainless steel conduit and nipple, to the conduit opening of the switch housing. This will give you an accessible point to terminate the control wires. **DO NOT USE** any ferromagnetic material such as: carbon steel, duplex, 400 series stainless steel, or cast iron.

5.0 Set-up

SAFETY INSTRUCTIONS

Do not apply power to the switch while performing these tests.

5.1 Initial Test

Use an ohmmeter to verify the following conditions.

Model	Switch Orientation	Wire Color		
		Black	Red	Blue
MGS-314L/314M	Switch at position "A" (liquid level below switch)	Common	Open	Closed
	Switch at position "B" (liquid level below switch)	Common	Closed	Open

Table 1

If these conditions do not exist, go to Section 6.0.

6.0 Troubleshooting

6.1 Introduction

Your Penberthy Magnetic Level Gage Switch is designed to give you years of unattended service. However, failure of electrical equipment can occur. Sound maintenance practices require periodic inspection of the instrument to ensure it is in good working order.

SAFETY INSTRUCTIONS

Do not apply power to the switch while performing these tests.

6.2 Switch Test

With the switch at position "A" use an ohmmeter to verify the conditions in Section 5.1. Using a magnet, move the switch to position "B". If the switch still doesn't change state, it is defective. Go to Section 8.0.

7.0 Disposal at End of Useful Life

Penberthy Model MGS-314L/314M Level Control Switches are used in a variety of fluid applications. By following the appropriate federal and industry regulations, the user must determine the extent of preparation and treatment the switch must incur before their disposal. A Material Safety Data Sheet (MSDS) may be required before disposal services accept certain components.

Metal, glass and polymers should be recycled whenever possible. Refer to order and TV&C-Prophetstown Material Specification sheets for materials of construction.

8.0 Telephone Assistance

If you are having difficulty with your Model MGS-314L/314M Level Control Switch, notify your local Penberthy representative, or call the factory direct (815) 537-2311. To help us assist you more effectively, please have as much of the following information as possible when you call:

Instrument Model Number
Name of the company from whom you purchased the switch
Invoice number and Date
Process Material
Operating Process Temperature
Brief description of the problem
Troubleshooting procedures that failed

If attempts to solve your problem fail, you may be requested to return you instrument to the factory for intensive testing. You must obtain a Return Authorization (R.A.) number from Penberthy prior to returning your unit.

Failure to do so will result in the unit being returned to you without being tested freight collect. To obtain a R.A. number gather the following additional information;

Reason for Return
Person to contact at your company
“Ship-To” address

We recommend that you return the entire unit for testing. There will be a minimum charge applied for evaluation of non-warranty units. You will be contacted before we repair the unit if there will be any additional charges in excess of the minimum. If you return a unit that is covered by the warranty, but is not defective, the minimum charge will apply.

A	BB 11/5/92	B	33924-2 JS 9/10/93	C	33924-3 JS 11/16/93	RF-1D	34125 C.T. 10/8/97						
REVISED NOTES ADDED 3 WIRE CONFIGURATION		ADDED I.S. & CSA CHANGES		REMOVED STAHL ADDED DIODE RETURN ONLY		ADDED MGS-314M, L & F							

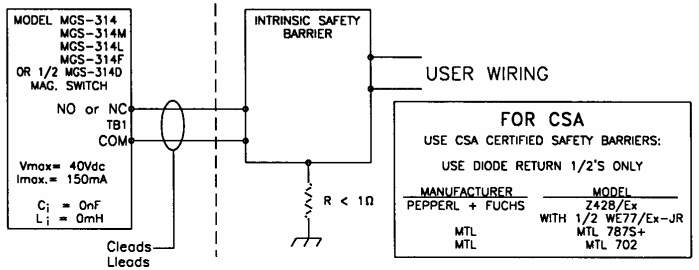
7E742-009 REV. RF-1D

NOTES UNLESS OTHERWISE SPECIFIED

TWO WIRE ENTITY CONTROL DRAWING

HAZARDOUS AREA | NON-HAZARDOUS AREA

CLASS I DIV 1 GROUP A,B,C,D
CLASS II DIV 1 GROUP E,F,G
CLASS III DIV 1



FOR CSA

USE CSA CERTIFIED SAFETY BARRIERS:

USE DIODE RETURN 1/2'S ONLY

MANUFACTURER	MODEL
PEPPERL + FUCHS	Z428/Ex WITH 1/2 WE77/Ex-JR
MTL	MTL 787S+
MTL	MTL 702

UNUSED NO OR NC LEAD SHALL BE BLIND TERMINATED AND INSULATED.

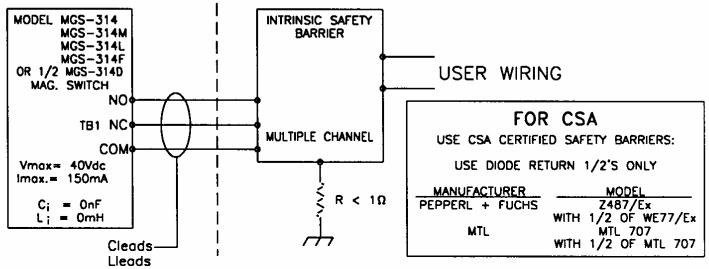
THE INTRINSIC SAFETY BARRIER PARAMETERS MUST MEET THE FOLLOWING REQUIREMENTS:
Voc ≤ 40V; Isc ≤ 150mA; Co ≥ Cleads; Lo ≥ Lleads

OR

THREE WIRE ENTITY CONTROL DRAWING

HAZARDOUS AREA | NON-HAZARDOUS AREA

CLASS I DIV 1 GROUP A,B,C,D
CLASS II DIV 1 GROUP E,F,G
CLASS III DIV 1



FOR CSA

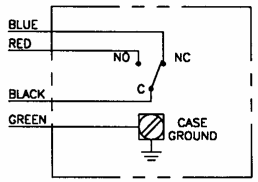
USE CSA CERTIFIED SAFETY BARRIERS:

USE DIODE RETURN 1/2'S ONLY

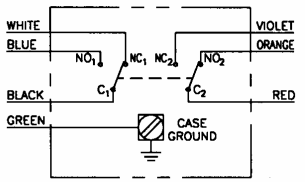
MANUFACTURER	MODEL
PEPPERL + FUCHS	Z487/Ex WITH 1/2 OF WE77/Ex
MTL	MTL 707 WITH 1/2 OF MTL 707

ONE MULTIPLE CHANNEL INTRINSIC SAFETY BARRIER MUST BE USED.
THE BARRIER PARAMETERS MUST MEET THE FOLLOWING REQUIREMENTS:
Vt ≤ 40V; It ≤ 150mA; Co ≥ Cleads; Lo ≥ Lleads

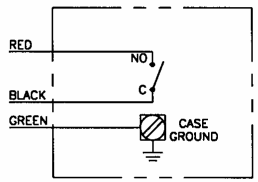
MGS-314, MGS-314M & MGS-314L CONNECTIONS



MGS-314D CONNECTIONS



MGS-314F CONNECTIONS



INSTALLATION SHALL CONFORM TO THE MANUFACTURER'S INSTRUCTIONS SUPPLIED WITH THE INTRINSIC SAFETY BARRIER AS WELL AS THE NATIONAL ELECTRIC CODE AND ANSI/ISA-RP12.6 OR CSA C22 "INSTALLATION OF INTRINSICALLY SAFE INSTRUMENT SYSTEMS IN HAZARDOUS (CLASSIFIED) LOCATIONS."

MAXIMUM NON-HAZARDOUS AREA VOLTAGE MUST NOT EXCEED 250 Vrms OR Vdc.

FOR I.S. INSTALLATION, TEMPERATURE SHALL NOT EXCEED 107°C [225°F]

NO CHANGES TO THIS DRAWING WITHOUT PREVIOUS APPROVAL FROM THIRD PARTY AGENCIES.

DASH NO.	NAME	MATERIAL DESCRIPTION	MATERIAL SPECIFICATION

UNLESS OTHERWISE SPECIFIED
Ref.: ANSI Y14.5M
PROJECTION
TOLERANCES ON MACHINED DIMENSIONS:
.X = ±.063[1.60] Fractional dimensions: ±1/8[3]
.XX = ±.031 [.79] Angles: ± 30 minutes
.XXX = ±.015[.38] 250 AARH max.
TOLERANCES ON CAST OR FABRICATED DIMENSIONS:
Fractions: ± 1/8[3] Angles: ± 1 degree
Fillet: .000 thru +.063[1.60]
ALL DIMENSIONS ARE IN INCHES [MILLIMETERS]

Tyco/Flow Control/Tyco Valves & Controls, LP
PROPHETSTOWN, IL. USA 61277

COMPUTER SCALE 1=1	DRAWN B. Beach	APPROVED	DO NOT SCALE	
DRAWING SCALE 1=1	DATE 10-8-92	REL. NO. 9190		

TITLE
INTRINSIC SAFETY
CONTROL DRAWING MGS-314x

SHEET 1 OF 1 | REV. RF-1D

DRAWING NO. 7E742-009

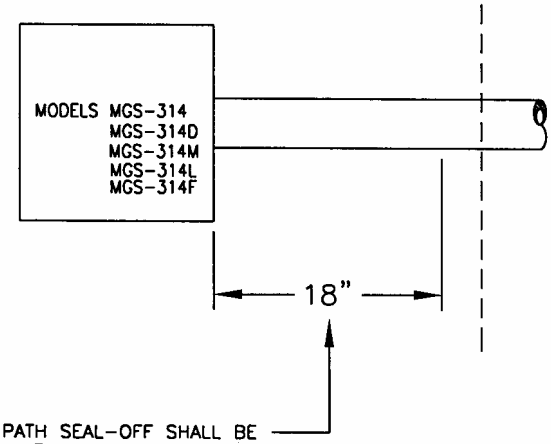
DWG. NO. 7E741-009

REVISION			
REV.	DESCRIPTION	DATE	BULL. NO.
A	REMOVED CASE TEMP.	1/8/93	9190
B	ADDED MGS-314D	1/7/97	#33924-5
RF1-C	ADDED MGS-314M, L & F	10/8/97	#34125

CONTROL DRAWING

HAZARDOUS AREA | NON-HAZARDOUS AREA

CLASS I DIV 1 GROUP B,C,D
CLASS II DIV 1 GROUP E,F,G
CLASS III DIV 1



A FLAME PATH SEAL-OFF SHALL BE INSTALLED WITHIN 18 IN. OF ENCLOSURE

WIRING TO BE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE (NEC) PERTINENT PARTS OF THE 500 SERIES OF ARTICLE 5 OR LOCAL CODES AS APPLICABLE.

NO CHANGES TO THIS DRAWING WITHOUT PREVIOUS APPROVAL FROM FACTORY MUTUAL.

UNLESS OTHERWISE SPECIFIED
Ref.: ANSI Y14.5M
PROJECTION

TOLERANCES ON MACHINED DIMENSIONS:
.X = ±.063[1.60] Fractional dimensions: ±1/8[3]
.XX = ±.031 [.79] Angles: ± 30 minutes
.XXX = ±.015[.38] 250 AARH max.
TOLERANCES ON CAST OR FABRICATED DIMENSIONS:
Fractions: ± 1/8[3] Angles: ± 1 degree
Fillet: .000 thru +.063[1.60]
ALL DIMENSIONS ARE IN INCHES [MILLIMETERS]

PENBERTHY
a Tyco Flow Control Company
PROPHETSTOWN, IL. USA 61277

EXPLOSION PROOF
TITLE CONTROL DRAWING MGS-314X

COMPUTER SCALE: 1=1	APVD. *13*	
DRAWING SCALE: 1=1	REV. RF1-C	
REL. 9190	SHEET 1 OF 1	
DRW. *B. Beach*	DATE 10-8-92	DRAWING NO. 7E741-009

NOTES

Tyco Valves & Controls, L.P. Prophetstown
320 Locust St., Prophetstown, Illinois 61277
Phone: 815-537-2311
FAX: 815-537-5764
Printed in USA
Form # 18Z40-009